Claims

1. Process for the treatment of a wafer (1, 2) that carries on one side (front side) components (2), said process comprising the following steps:
   - application of a layer system to the front side of the wafer (1, 2), wherein the layer system includes at least an interlayer (3) in contact with the front side of the wafer (1, 2), and a carrier layer (4),
   - thinning of the rear side of the wafer (1, 2) so that the layer system protects or carries (holds) the wafer or parts of the wafer during the thinning.

2. Process according to claim 1, with the following additional step:
   - coating of the thinned rear side of the wafer (1c, 2) so that the layer system protects or carries the wafer (1c, 2) or parts of the wafer during the coating.

3. Process according to claim 1 or 2, with the following feature:
   - division of the wafer (1, 2; 1c, 2), in which the layer system protects or carries the wafer or parts of the wafer during the division, wherein the division is carried out as a separate step or is effected by the thinning, and the layer system is separated or is not separated during the division.

4. Process according to claim 3, with the following additional step:
   - smoothing of the rear side of the wafer (1b, 2) so that the mechanical properties of the wafer are altered, preferably in such a way that the division of the wafer (1b, 2) is effected or promoted and/or the coating of the thinned rear side of the wafer (1c, 2) is promoted.

5. Process according to one of the preceding claims, with the following additional step before the fabrication of the layer system on the front side of the wafer (1, 2):

- structuring of the wafer (1, 2) by grinding and/or scoring and/or chemical etching and/or physical etching, so that the formed structures open during the thinning of the rear side or during a subsequent treatment of the rear side and divide the wafer (1c, 2).

6. Process according to one of the preceding claims, in which (a) a laser beam or (b) a mechanical method, preferably abrasive cutting, sawing or fracturing, is used to divide the wafer (1, 2; 1b, 2; 1c, 2).

7. Process according to one of the preceding claims, with the following step after the division:

- reduction of the adhesion (a) of the layer system to the wafer (1, 2; 1b, 2; 1c, 2), or (b) of the carrier layer (4) to the adjacent layer of the layer system on the wafer side, preferably the interlayer (3).

8. Process according to claim 7, in which the reduction of the adhesion in the case (a) of the layer system or in the case (b) of the carrier layer (4) is achieved by (i) irradiation with electromagnetic radiation, (ii) thermal action, (iii) chemical action and/or (iv) mechanical action.

9. Process according to one of the preceding claims, in which the interlayer (3) is mechanically detached from the carrier layer (4) or from the wafer (1, 2; 1b, 2; 1c, 2) or from the parts of the wafer.

10. Process according to one of the preceding claims, in which the interlayer (3) of the layer system is applied by vacuum technology.

11. Process according to one of the preceding claims, in which the carrier layer (4) consists of a plastics composition.

12. Process according to one of the preceding claims, in which the carrier layer (4) is applied by means of a spincoater.

13. Process according to one of claims 1 to 12, in which the carrier layer (4) is hardened by means of heat or irradiation with light.

14. Process according to one of the preceding claims, in which the layer system comprises a layer that is arranged on the side of the carrier layer (4) facing away from the wafer and (a) is in the form of a film or (b) is in the form of a composition of inorganic and/or organic material.

15. Process according to one of the preceding claims, in which the thinning of the rear side of the wafer is carried out by (i) abrasion, (ii) lapping, (iii) wet chemical etching and/or (iv) plasma etching.

16. Process according to one of the preceding claims, with the following steps:

a) application of a layer system to the front side of the wafer (1, 2), with an interlayer (3) contacting the front side of the wafer, and a carrier layer (4),

b) hardening and/or consolidation of the carrier layer (4),

c) thinning of the rear side of the wafer (1, 2),

d) smoothing of the rear side of the wafer (1, 2; 1b, 2) so that the mechanical properties of the wafer (1, 2; 1b, 2) are altered, preferably in such a way that the division of the

wafer (1, 2; 1b, 2) is effected or promoted and/or the coating of the thinned rear side of the wafer (1, 2; 1b, 2) is promoted,

e) coating of the thinned rear side of the wafer (1, 2; 1b, 2; 1c, 2), in which the layer system protects or carries the wafer and/or parts of the wafer during the coating,

f) division of the components of the wafer (1, 2; 1b, 2; 1c, 2), in which the layer system protects or carries the wafer and/or parts of the wafer during the coating and the layer system is not separated during the division, and

g) optionally mechanical detachment of the interlayer (3) from the carrier layer (4) or from the wafer (1, 2; 1b, 2; 1c, 2) or from the parts of the wafer.

17. Process according to one of the preceding claims, in which the layer system is applied so that the interlayer (3) adheres to the front side of the wafer (1, 2; 1b, 2; 1c, 2) and adheres more strongly to the carrier layer (4) than to the wafer.

18. Apparatus for carrying out the process according to one of the preceding claims, comprising:

- means for the application of a layer system to the front side of a wafer (1, 2; 1b, 2; 1c, 2), in which the layer system comprises at least an interlayer (3) contacting the front side of the wafer, and a carrier layer (4), and
- means for thinning the rear side of the wafer (1, 2) provided on the front side with the layer system, which means are arranged so that the layer system protects or carries the wafer and/or parts of the wafer during the coating,

as well as optionally:

- means for coating the thinned rear side of the wafer (1b, 2; 1c, 2), which means are arranged so that the layer system

protects or carries the wafer and/or parts of the wafer during the coating, and/or

- means for dividing the components of the wafer (1, 2; 1b, 2; 1c, 2), which means are arranged so that the layer system protects or carries the wafer and/or parts of the wafer during the division, in which
  the division is carried out as a separate step or is implemented by the thinning, and
  the layer system is separated or not separated during the division, and/or
- means for the structuring of the wafer (1, 2; 1b, 2; 1c, 2) by grinding and/or scoring and/or chemical etching and/or physical etching, which means co-operate with other constituents of the apparatus so that the structures that are formed open during the thinning of the rear side or during a subsequent treatment of the rear side and divide the wafer, and/or
- means for reducing the adhesion (a) of the applied layer system to the wafer (1, 2; 1b, 2; 1c, 2) or (b) of the carrier layer (4) to the adjacent layer of the layer system on the wafer side, preferably the interlayer (3), and/or
- means for the detachment of the wafer (1, 2; 1b, 2; 1c, 2) or of parts of the wafer from the layer system.

19. Wafer (1, 2; 1b, 2; 1c, 2) with a carrier layer (4) and an interlayer (3) arranged between the carrier layer (4) and the wafer, characterised in that the interlayer (3) is a plasmapolymeric layer that adheres to the wafer (1, 2; 1b, 2; 1c, 2) and adheres more firmly to the carrier layer (4) than to the wafer.

20. Wafer (1, 2; 1b, 2; 1c, 2) according to claim 19, in which the wafer (1, 2; 1b, 2; 1c, 2) consists substantially of optionally doped silicon.

21. Wafer (1, 2; 1b, 2; 1c, 2) according to claim 19 or 20, in which the wafer (1, 2; 1b, 2; 1c, 2) comprises on its front side an active layer (2) with electronic components and the interlayer (3) is arranged on the front side.

22. Wafer (1, 2; 1b, 2; 1c, 2) according to one of claims 19 to 21, in which the interlayer (3) is a gradient layer and/or comprises an adhesive zone (3b) adjacent to the carrier layer (4) and a dehesive zone (3a) adjacent to the wafer (1, 2; 1b, 2; 1c, 2), as well as optionally a transition zone, in which the adhesive zone (3b) and the dehesive zone (3a) are composed of different substances.

23. Wafer (1, 2; 1b, 2; 1c, 2) according to one of claims 19 to 22, in which the interlayer (3) includes on the wafer side a previously liquid precursor as an integral constituent.

24. Wafer (1, 2; 1b, 2; 1c, 2) according to one of claims 19 to 23, in which the interlayer (3) adheres to the wafer and to the carrier layer (4) at temperatures of up to at least 350°C, preferably up to at least 380°C and particularly preferably up to at least 400°C.

25. Wafer (1, 2; 1b, 2; 1c, 2) according to one of claims 19 to 24, in which the interlayer (3) can be stripped in a substantially residue-free manner from the wafer.

26. Wafer (1, 2; 1b, 2; 1c, 2) according to one of claims 19 to 25, in which the interlayer (3) and the wafer can be mechanically detached.

27. Wafer (1, 2; 1b, 2; 1c, 2) according to one of claims 19 to 26, in which the carrier layer (4) consists of a polymeric material.

28. Wafer (1, 2; 1b, 2; 1c, 2) according to one of claims 19 to 27, in which the interlayer (3) has a thermal conductivity that is less than that of the wafer by at most 10%.

29. Process for the production of a wafer (1, 2; 1b, 2; 1c, 2) with a carrier layer (4) and an interlayer (3) arranged between the carrier layer (4) and the wafer (1, 2; 1b, 2; 1c, 2), said process comprising the steps:

a) supplying a wafer (1, 2; 1b, 2; 1c, 2),

b) provision of the wafer (1, 2; 1b, 2; 1c, 2) with a plasmapolymeric interlayer (3) so that this adheres to the wafer (1, 2; 1b, 2; 1c, 2),

c) application of a carrier layer (4) to the interlayer (3) so that the interlayer (3) adheres more firmly to the carrier layer (4) than to the wafer (1, 2; 1b, 2; 1c, 2).

30. Process according to claim 29, in which the wafer (1, 2; 1b, 2; 1c, 2) comprises on its front side an active layer with electronic components and the interlayer (3) is arranged on the front side.

31. Process according to claim 29 or 30, in which in step b) the interlayer (3) is deposited on the wafer (1, 2; 1b, 2; 1c, 2), wherein the deposition conditions are varied over time so that the produced interlayer (3) is a gradient layer and/or comprises an adhesive zone (3b) for the application of the carrier layer (4) and a dehesive zone (3a) adjacent to the wafer (1, 2; 1b, 2; 1c, 2), as well as optionally a transition zone.

32. Process according to one of claims 29 to 31, in which the wafer (1, 2; 1b, 2; 1c, 2) is wetted with a liquid precursor before step b).

33. Process according to claim 32, in which the liquid precursor is a separation-active substance.

34. Process according to claim 32 or 33, in which the liquid precursor is applied to the wafer (1, 2; 1b, 2; 1c, 2) by means of dipping, spraying or a spincoating process.

35. Process according to one of claims 32 to 34, in which the step b) is carried out so that the liquid precursor is crosslinked and becomes an integral constituent of the interlayer (3).

36. Process for the thinning of a wafer (1, 2) comprising the following steps:

- production of a wafer (1, 2) with a carrier layer (4) and an interlayer (3) arranged between the carrier layer (4) and the wafer (1, 2), according to a process in accordance with one of claims 29 to 35, in which a wafer (1, 2) to be thinned is prepared in step a) and
- thinning of the rear side of the wafer (1, 2).

37. Process for metallizing the rear side of a wafer (1, 2; 1b, 2; 1c, 2), comprising the following steps:

- production and optionally thinning of a wafer (1, 2; 1b, 2; 1c, 2) with a carrier layer (4) and an interlayer (3) arranged between the carrier layer (4) and the wafer (1, 2; 1b, 2; 1c, 2), according to a process in accordance with one of claims 29 to 36, and
- application of a metal layer to the rear side of the wafer (1, 2; 1b, 2; 1c, 2).

38. Process according to claim 36 or 37, in which the interlayer (3) and the carrier layer (4) are removed again from the wafer (1b, 2; 1c, 2) after the thinning and/or the metallization of the rear side.

39. Process according to one of claims 29 to 38, in which in step a) there is supplied a wafer (1, 2; 1b, 2; 1c, 2) prepared for the separation into individual elements.

40. Process according to claim 39, in which a separation of the wafer (1, 2; 1b, 2; 1c, 2) - optionally with the exception of the rear side metallization - into individual elements is effected by the thinning or by the removal of the interlayer (3) and carrier layer (4).